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CLAIMS

1. A purified protein having desaturase activity, and comprising an amino acid sequence selected from the group consisting of:

(a) an amino acid sequence as shown in SEQ. ID NO. 4;

(b) an amino acid sequence that differs from that specified in (a) by one or more conservative amino acid substitutions; and

(c) an amino acid sequences having at least 60% sequence identity to the sequences specified in (a) or (b).

2. An isolated nucleic acid molecule encoding a protein according to claim 1.

3. The isolated nucleic acid molecule of claim 2, comprising a sequence as shown in SEQ ID NO: 2.

4. A recombinant nucleic acid molecule, comprising a control sequence operably linked to the nucleic acid sequence of claim 2.

5. A cell transformed with the recombinant nucleic acid molecule of claim 4.

6. A cell transformed with the recombinant nucleic acid molecule of claim 4 and a nucleic acid molecule selected from the group consisting of:

(a) a nucleic acid molecule as shown in SEQ ID NO: 1; and

(b) a nucleic acid molecule that has 60% sequence identity to the nucleic acid molecule shown in (a).

7. The cell of claim 5, wherein the cell is a plant cell.

8. An isolated nucleic acid molecule that:

(a) hybridizes under low-stringency conditions with a nucleic acid probe, the probe comprising a sequence as shown in SEQ ID NO: 3, and fragments thereof; and

(b) encodes a protein having desaturase activity.

9. A desaturase encoded by the nucleic acid molecule of claim 8.

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10. A recombinant nucleic acid molecule, comprising a promoter sequence operably linked to the nucleic acid molecule of claim 8.

11. A cell transformed with the recombinant nucleic acid molecule of claim 10.

12. A transgenic organism, comprising the transformed cell of claim 11, wherein the transgenic organism is selected from the group consisting of plants, bacteria, insects, fungi, and mammals.

13. A specific binding agent that binds to the desaturase of claim 9.

14. An isolated nucleic acid molecule that:

(a) has at least 60% sequence identity with a nucleic acid sequence as shown in SEQ ID NO: 3; and

(b) encodes a protein having desaturase activity.

15. A method of identifying a nucleic acid sequence, comprising:

(a) hybridizing the nucleic acid sequence to at least 10 contiguous nucleotides of a sequence as shown in SEQ ID NO: 3; and

(b) identifying the nucleic acid sequence as one that encodes a desaturase.

16. A nucleic acid molecule identified by the method of claim 15.

17. The method of claim 15, wherein hybridizing the nucleic acid sequence is performed under low-stringency conditions.

18. A desaturase encoded by the nucleic acid molecule of claim 15.

19. A specific binding agent, that binds the desaturase of claim 18.

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comprising:

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20. The method of claim 15, wherein step (a) occurs in a PCR reaction.
21. The method of claim 15, wherein step (a) occurs during a library screening.
22. A method for creating a double bond between two carbons in a fatty acid, comprising:
 - contacting a fatty acid with at least one purified desaturase of claim 17; and
 - allowing the desaturase to create a double-bond between two carbons.
23. The method of claim 22, wherein the desaturase is expressed in a prokaryotic organism and the double-bond formation occurs *in vivo*.
24. The method of claim 23, wherein the desaturase is expressed in an organism selected from the group consisting of eukaryotes and prokaryotes.
25. The method of claim 22, wherein the desaturase is expressed *in vitro* and double-bond formation occurs *in vitro*.
26. The method of claim 22, further comprising expressing a second desaturase.
27. The method of claim 26, wherein the second desaturase is selected from a group consisting of:
 - (a) an amino acid sequence as shown in SEQ. ID NO. 2;
 - (b) an amino acid sequence that differs from those specified in (a) by one or more conservative amino acid substitutions; and
 - (c) an amino acid sequences having at least 60% sequence identity to the sequences specified in (a) or (b).